Sclerotinia in horticultural crops - integrated management

Dr. Hoong Pung
Managing Sclerotinia diseases 1997-2007

- **Short term during crop period**
  - Agronomy / crop management
  - Reduce disease conducive conditions
  - Optimise chemical control

- **Long term between crops**
  - Pre-plant treatment - reduce sclerotia in soil
  - Crop rotations, biofumigant crops - break disease cycle
  - Soil health - microbial diversity, soil structure
Sclerotinia control during bean crops

✔ Optimising Chemical control (1997-2000)
  • Fungicide selection
  • Fungicide resistance
  • Application methods
  • Water volume ?
  • Surfactants / Stickers ?
Fungicide efficacies under high disease pressure

1997 to 2000 - procymidone most effective fungicide

% Diseased Plants

- Control
- benomyl
- carbendazim
- procymidone

60  70  80  90  100
Timing of applications
Merseylea, Tasmania 2005

% *Sclerotinia* infected plants

3 sprays applied at late flowering

3 sprays applied at early flowering
Efficacy affected by the 1st Fungicide Application 1999

Flowering based on % plants with first flower

- Untreated control
- 90% flower
- 10% flower

- %Diseased plants
- %Plants with severe infections
Effects of spray nozzles & water volume 1998

Effects of spray nozzle type

Effects of spray water volume

- Untreated control
- Fanjet TP11002
- Conejet TX18
- Conjet TX10
- Conejet TX4

Increasing spray water volume (L/ha)

Mean disease severity

- %Plants infected

Mean disease severity index

Professional knowledge through experience.
Number of fungicide applications 2006

% *Sclerotinia* infected bean plants

- **Control**: 3 sprays at 7 day intervals; 1st spray at 20-30% open flowers
- **Amistar WG**: Commercial sprays at 10 day intervals, 1st spray at 20-30% open flowers
- **Sumisclex**: 3 sprays at 7 day intervals; 1st spray at 20-30% open flowers
- **Filan**: 3 sprays at 7 day intervals; 1st spray at 20-30% open flowers
- **Filan 1.0 kg**: Commercial sprays at 10 day intervals, 1st spray at 20-30% open flowers
Wetting agents – effects on coverage & performance 2007

% Sclerotinia infected plants +/- SE

- Filan 125gai
- Filan 250gai
- Filan 500gai
- Filan 125gai + Du-Wett
- Filan 250gai + Du-Wett
- Filan 500gai + Du-Wett
- Filan 125gai + Activator
- Filan 250gai + Activator
- Filan 500gai + Activator

without adjuvant

+ Du-Wett

+ Activator
Chemical control on beans – key findings

• No fungicide resistance
  • with procymidone, boscalid

• Field conditions – reduce risk factors

• Application methods
  • Types of fungicides
  • Timing of sprays
  • Number of sprays
  • Wetting agent
  • 250 to 300 L water /ha adequate
Other strategies 2000-2004

- Short term during crop period
  - Biocontrol agents
  - Other non-fungicides

- Long term between crops
  - Pre-plant treatments - reduce sclerotia in soil
  - Crop rotations, biofumigant crops - break disease cycle
  - Soil health - microbial diversity, soil structure
Green manure crops

- Break crop / biofumigation
- Organic matter
- Soil microbes
- Soil structure
- Soil nutrient
Biofumigant crops - reduce Sclerotinia wilt (lettuce drop)

Plants sown in July 2001, mulched into soil in November, lettuce planted in December

- Untreated Control
- Oats
- Broad bean
- FUMUS
- BQ-MULCH

% Sclerotinia infected plants at harvest
Fodder rapes - more effective in suppressing *Sclerotinia minor*

- **Fodder rapes**
  - BQ-Graze
  - BQ-Mulch
  - Mustards
  - Fumus
  - Nemfix

- % Sclerotinia infected plants
  - Fodder rapes: 24 to 26
  - Mustards: 30
  - Fumus: 20
  - Nemfix: 15

- Total ITCs in roots (umole/g)
  - BQ-Graze: 0
  - BQ-Mulch: 5
  - Mustards: 10
  - Fumus: 20
  - Nemfix: 25
Fungicide alternatives to procymidone (Sumisclex)

% *Sclerotinia* infected plants

**Sclerotinia minor - Pyrethrum (December 2004)**

- 3 sprays at 1 month intervals;
- 1st spray in August with active vegetative growth

**Sclerotinia sclerotiorum - Green bean (March 2005)**

- 3 sprays at 7 day intervals;
- 1st spray at 20-30% open flower
Low cost products for improving disease control & yield

- Filan / Sumisclex plus (~ $60 - $100/ha)
- Agri-Fos (~ $18/ha)
- Micro-Gyp (~ $1.50/ha)

1% to 5% yield improvement for vegetables
Soil amendments

Effects of soil treatments on sclerotia viability - a lab study
(15/11/01 ~ 22 weeks)
Soil amendments

Field trial within a commercial iceberg lettuce crop at Cuprona, Tasmania

- Untreated control
- Mustard meal
- Organic by-product
- Fertiliser & soil fumigant

% Sclerotinia infected plants

- Untreated control
- Mustard meal
- Pelka
Biocontrol agents - Coniothyrum minitans, a fungal parasite of Sclerotinia

Field trial within a commercial cos lettuce crop in Southern Tasmania

BCA001 (Contans) is a commercial product, sold in Europe & America
Non-chemical alternatives 2000-2005

- Will not replace chemical use
- Part of integrated management?
- *S. sclerotiorum* vs *S. minor*

- Suppress/reduce pathogen in soil
  - Biocontrol agents?
  - Brassica green manures
  - Crop rotations
Adoption of R & D outcomes (2000-2007) for improvement in Sclerotinia control

✓ 1998 - water volume - 250 to 300 L/ha adequate
✓ 1999 - early 1st spray timing on bean flowers
✓ 2003 pyrethrum, 2004 beans - use of gypsum with fungicide
✓ until 2004 - procymidone
✓ 2004 - BQ-Mulch (biofumigant crop)
✓ 2004 - boscalid (Filan) - emergency permit use
✓ 2005 - irrigation management (by Serve-Ag)
✓ 2007/08 – boscalid – application for registration use
✓ 2007 - use of Du-Wett with boscalid
✓ 2006 - Gympie, Queensland (an exception)
  • Constant hot, humid, wet condition & susceptible cultivars
  • Procymidone gives better efficacy, but still have ~ 20-30% infected plants